

HISTORY KEPT YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>		<b>ILLINOIS HIGHWAY INFORMATION SYSTEM</b> <b>STRUCTURE INFORMATION AND PROCEDURE MANUAL</b>	
NBIS REQUIRED YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>		ITEM NAME <b>SUPERSTRUCTURE CONDITION</b>	ITEM NO. <b>59</b> PAGE <b>1 of 6</b> EFF. DATE <b>07/01/02</b>
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RESPONSIBLE FOR UPDATE	District Local Roads	District Maintenance / Operations	
STRUCTURES	Local	State	
UPDATE SCREENS	(12) Inspection / Appraisals	(2) Inspection	
INQUIRY SCREENS	(12) Inspection / Appraisals	(2) Inspection, 1 of 2	

### DESCRIPTION AND PURPOSE OF ITEM

This item describes the physical condition of all structural members of the Superstructure as it affects the structural sufficiency of the bridge.

The structural members should be inspected for signs of distress which may include cracking, deterioration, section loss, and malfunction and misalignment of bearings.

The condition of bearing devices, diaphragms & braces, truss portals & bracing, rivets & bolts, and paint may be rated and recorded on the inspection form using the rating scales described under "Element Ratings - General" (refer to Item No. Composite which follows Item No. 58-62, Item Name "Condition Ratings – General." Also see Appendix E, Form BBS-BIR-1). These element ratings do not directly affect the condition rating. Element ratings will also be recorded on the inspection form for stringers, girders & beams. Of course, deficiencies in these elements may also affect the superstructure condition rating. The utilities and paint elements should be completed using the codes in Items 59A, B and C. These elements are exceptions as they are to be recorded in the computer record even though they do not directly affect the sufficiency of the superstructure.

On bridges where the deck is integral with the superstructure, the superstructure and deck condition ratings may be affected by one another. It should be noted, however, that the superstructure condition rating differs from the deck condition rating in that it is more related to the ability to carry overall vehicular loading rather than the individual wheel loads that the deck is designed to carry. For example, an integral deck may have instances of full depth failures that have very little effect on the ability of the superstructure to perform its function.

Fracture critical components should receive careful attention because failure could lead to collapse of a span or the bridge. The Superstructure Condition Rating should not be higher than the Fracture Critical Appraisal Rating (Item 93A1) though it may be lower.

Needed repairs should be recorded on designated forms and reported to appropriate personnel in accordance with the policies of the maintaining agency.

History is retained for this item based on each Inspection Date - Item 90.

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## CODE AND SCREEN ENTRY INSTRUCTIONS

A one-digit field.

Rate and code the structure's condition in accordance with the "Condition Ratings - General" described on the preceding pages (Item No. 58-62 discussion, pages 1 of 2 and 2 of 2).

The Condition Rating Guides for Specific Superstructure types on the following pages (pages 3 of 6 through 6 of 6) are intended only to provide some assistance in recognizing typical kinds of superstructure deficiencies and relating them to an appropriate Superstructure Condition Rating.

All Superstructure Types will use the same coding guidelines as described below for superstructure rating codes of N, 9, 1, and 0 (zero).

## FOR ALL SUPERSTRUCTURE MATERIAL TYPES

### CONDITION RATING GUIDES FOR CODES N, 9, 1 AND 0

<u>Code</u>	<u>Description</u>
<b>N</b>	Culvert.
<b>9</b>	New superstructure.
<b>1</b>	Superstructure in "imminent failure" condition requiring bridge closure or temporary measures to allow structure to remain open.
<b>0</b>	Superstructure that has failed and is beyond repair, requiring bridge closure.

**Condition Rating Guides for codes 2 through 8** pertaining to specific superstructure material types are described on the following pages.

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### CONDITION RATING GUIDES FOR SPECIFIC SUPERSTRUCTURE MATERIALS

#### STEEL SUPERSTRUCTURE

<u>Code</u>	<u>Description</u>
<b>8</b>	VERY GOOD. No visible rust.
<b>7</b>	GOOD. Some rust may be present but without any section loss.
<b>6</b>	SATISFACTORY. Initial section loss (minor pitting, scaling, or flaking) in non-critical areas.
<b>5</b>	FAIR. Initial section loss in critical areas. Fatigue or out-of-plane bending cracks may be present in non-critical areas. Hinges may be showing minor corrosion problems.
<b>4</b>	POOR. Section loss in critical area resulting in need for load evaluation. Fatigue or out-of-plane bending cracks may be present in major structural elements.
<b>3</b>	SERIOUS. Severe section loss or cracking in a critical area to the point where a load restriction is needed. Minor failures may have occurred.
<b>2</b>	CRITICAL. Same as condition rating "3" but a reduced interval Special Inspection is necessary to keep the bridge open.

#### REINFORCED CONCRETE SUPERSTRUCTURE

<u>Code</u>	<u>Description</u>
<b>8</b>	VERY GOOD. No significant defects. Very minor shrinkage cracks, surface scaling, spalling or pop-outs which do not expose reinforcing steel may be present.
<b>7</b>	GOOD. Non-structural hairline cracks ( $\leq 0.30$ mm thick) without disintegration. Minor pop-outs or spalls may be present but no main reinforcing steel exposed. Stirrup or secondary reinforcement may be exposed in a few locations.
<b>6</b>	SATISFACTORY. Extensive non-structural hairline cracks and a few cracks larger than hairline may be present. Exposure of main reinforcement due to spalling or scaling with surface rust or very minor rust pitting possible.
<b>5</b>	FAIR. Substantial deterioration and/or disintegration but not affecting load capacity. Hairline structural cracks, extensive non-structural cracks and many areas of spalling may be present. Very minor section loss of reinforcing steel possible.

**NOTE:** For codes N, 9, 1 and 0 (zero) Condition Rating Guides pertaining to all superstructure material types, refer to Item No. 59, Page 2 of 6.

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### CONDITION RATING GUIDES FOR SPECIFIC SUPERSTRUCTURE MATERIALS

#### REINFORCED CONCRETE SUPERSTRUCTURE (cont'd)

<u>Code</u>	<u>Description</u>
4	POOR. Flexural or shear cracks greater than hairline thickness (unless a recent structural evaluation has determined them to have no effect on total load capacity). Main reinforcing steel exposed with significant section loss. Spalling or scaling of large portions of the deck which is judged to significantly reduce the distance from the top of sound concrete to the bottom layer of main steel reinforcement.
3	SERIOUS. Similar to the description for a condition rating of "4" although more extensive with deterioration to the point where load posting would be judged as necessary.
2	CRITICAL. Similar to the description for a condition rating of "3" although more extensive with deterioration to the point where the structure requires a reduced interval Special Inspection to remain open to traffic. Shear failures at beam-end bearing areas may exist which should be temporarily supported or repaired.

Note: Refer to the general discussion of Superstructure Condition (Item No. 59, page 1 of 5) for further discussion of the potential effect of an integral deck on superstructure evaluation.

#### PRESTRESSED CONCRETE BEAMS

**General Notes:** Prestressing strands, reinforcement bars or wire mesh should be considered exposed in areas where the concrete appears to be deteriorated and unsound to the level of the strands, bars or mesh. Strands adjacent to longitudinal cracks shall be interpreted as being exposed.

The dimensions stated below relate to the perimeter of the cross section of the beams.

<u>Code</u>	<u>Description</u>
8	VERY GOOD. No notable problems.
7	GOOD. No beams with prestressing strands, stirrup reinforcement bars or wire mesh exposed. Minor cracking may be present in keyways, but no leakage occurring through them, and no differential movement occurring between deck beams.
6	SATISFACTORY. <i>Center half of beams:</i> No beams with prestressing strands, stirrup reinforcement or wire mesh bars exposed. No longitudinal cracking or spalling along the bottom of the beams.  <i>End quarters of beams:</i> No more than 2 strands or 3" of stirrup reinforcement bars or 3" of wire mesh exposed in the bottom of any beam.

Small areas of wire mesh may be exposed due to inadequate concrete cover occurring during manufacturing. For deck beams, keyway cracking may be evident with minor leakage, but beams are still fully acting together.

**NOTE:** For codes N, 9, 1 and 0 (zero) Condition Rating Guides pertaining to all superstructure material types, refer to Item No. 59, Page 2 of 6.

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### CONDITION RATING GUIDES FOR SPECIFIC SUPERSTRUCTURE MATERIALS

#### PRESTRESSED CONCRETE BEAMS (cont'd)

<u>Code</u>	<u>Description</u>
5	<p><b>FAIR.</b> <i>Center half of beams:</i> No more than 2 strands or 3" of stirrup reinforcement bars or 3" of wire mesh exposed in any beam. Longitudinal cracking or spalling limited to one edge with no other defects exposing reinforcement, wire mesh or strands.</p> <p><i>End quarters of beams:</i> No more than 4 strands or 6" of stirrup reinforcement bars or 6" of wire mesh exposed in the bottom of any beam.</p> <p>Larger areas of wire mesh may be exposed due to inadequate concrete cover occurring during manufacturing. For deck beams, keyway cracking with extensive leakage and evidence that beams are beginning to act independently of each other.</p>
4	<p><b>POOR.</b> <i>Center half of beams:</i> Prestressed strands, stirrup reinforcement bars or wire mesh exposed for no more than 1/3 the width of any beam bottom.</p> <p><i>End quarters of beams:</i> Prestressed strands, stirrup reinforcement bars or wire mesh exposed for no more than 1/2 the width of any beam bottom.</p> <p>Extensive areas of wire mesh exposed and actively corroding due to inadequate concrete cover occurring during manufacturing. For deck beams, keyways have failed, beams are visibly acting independently of each other, but there is no other damage to the beams. Longitudinal cracks initiating in the bottom of deck beams within the center half of the beam width.</p>
3	<p><b>SERIOUS.</b> <i>Center half of beams:</i> Prestressing strands, stirrup reinforcement bars or wire mesh exposed for no more than 1/2 the width of any beam bottom.</p> <p><i>End quarters of beams:</i> Prestressing strands, stirrup reinforcement bars or wire mesh exposed for no more than 2/3 the width of any beam bottom.</p> <p>Transverse cracks in bottom of beams or hairline vertical/diagonal shear cracks in beam webs may be developing. Extensive spalling associated with areas of wire mesh exposed and actively corroding due to inadequate concrete cover occurring during manufacturing. For deck beams, keyways have failed, and beams visibly separated and acting independently of each other. Extensive longitudinal cracks present in the bottom of deck beams within the center half of the beam width.</p>
2	<p><b>CRITICAL.</b> Similar to but more serious and extensive than what is described for a condition rating of "3". Structural elements that are judged to be in critical condition must receive reduced interval Special Inspections in order for the structure to remain open to traffic. Measurable shear cracks.</p>

**NOTE:** For codes N, 9, 1 and 0 (zero) Condition Rating Guides pertaining to all superstructure material types, refer to Item No. 59, Page 2 of 6.

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**CONDITION RATING GUIDES FOR SPECIFIC SUPERSTRUCTURE MATERIALS**

**TIMBER SUPERSTRUCTURE**

<u>Code</u>	<u>Description</u>
<b>8</b>	VERY GOOD. May have only very minor defects in beams or stringers at non-critical locations.
<b>7</b>	GOOD. Minor insignificant decay, cracking, or splitting of beams or stringers.
<b>6</b>	SATISFACTORY. Some decay, cracking, or splitting of beams or stringers may be occurring near the main load carrying portions. Fire damage limited to surface scorching with no significant section loss.
<b>5</b>	FAIR. Substantial decay, cracking, or splitting of beams or stringers but no significant effect in critical areas such as beam ends and mid-span. Fire damage limited to surface charring with minor section loss.
<b>4</b>	POOR. Extensive decay, cracking, splitting or crushing of beams or stringers, or fire damage with main load carrying portions affected.
<b>3</b>	SERIOUS. Severe decay, cracking, splitting or crushing of beams or stringers, or fire damage with major section loss in critical load carrying portions of members. A further progression of problems noted for a condition rating of "4".
<b>2</b>	CRITICAL. Beam ends may be crushed or split with settlement of deck. Any further deterioration of problems noted for a condition rating of "3". Deterioration has progressed to the point where a reduced interval Special Inspection is necessary to allow bridge to remain open.

**NOTE:** For codes N, 9, 1 and 0 (zero) Condition Rating Guides pertaining to all superstructure material types, refer to Item No. 59, Page 2 of 6.